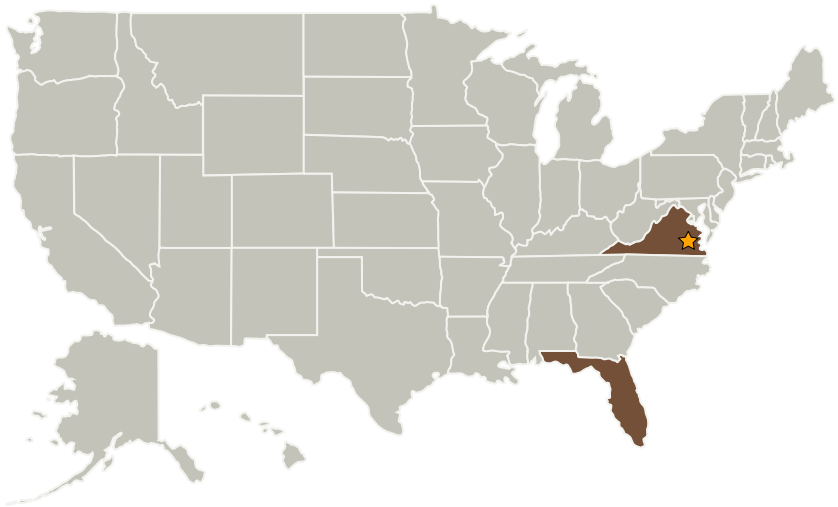
# High Power Compact Single-Frequency Volume Bragg Er-Doped Fiber Laser, Phase II

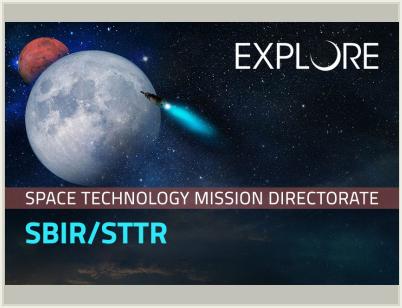
Completed Technology Project (2009 - 2011)

## Project Introduction

This proposal is based on successful results of Phase I project where it was shown that the use of volume Bragg gratings in PTR glass as selectors of transverse and longitudinal modes in external resonators of fiber lasers resulted in single-frequency oscillation. Technology of low-loss thick volume Bragg gratings in photo-thermo-refractive (PTR) glass which provide extremely narrow spectral width down to 60 pm in the spectral range of 1.5 um is developed. New narrow-band filters based on coherent and incoherent combinations of Fabry-Perot etalons and volume Bragg gratings are demonstrated. The main purpose of this NASA SBIR Phase II project is to develop the prototype of a compact single-frequency mode laser oscillator with pulse energy in millijoule region by means of pulse pumped Er-doped single-mode fiber. The main feature of the laser design is the use of new narrow-band filters based on a coherent and incoherent combination of Fabri-Perot etalons and volume Bragg gratings (VBGs) recorded in photo-thermo-refractive (PTR) glass for longitudinal and transverse mode selection in an external laser resonator. Those new spectral filters will be used in external resonators of large area photonic crystal fibers. Optimization of parameters of Bragg filters and active fibers will provide both single frequency operation and high pulse energy.

## Primary U.S. Work Locations and Key Partners



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## Table of Contents



## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Center / Facility:**

Langley Research Center (LaRC)

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

**Small Business Innovation Research/Small Business Tech Transfer**

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| Organizations Performing Work | Role | Type | Location |
|---|---|---|---|
| ★Langley Research Center(LaRC) | Lead Organization | NASA Center | Hampton, Virginia |
| OptiGrate Corporation | Supporting Organization | Industry | Orlando, Florida |

| Primary U.S. Work Locations | |
|---|---|
| Florida | Virginia |

## Project Transitions

**September 2009:** Project Start

**September 2011:** Closed out

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

## Technology Areas

**Primary:**

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.5 Lasers